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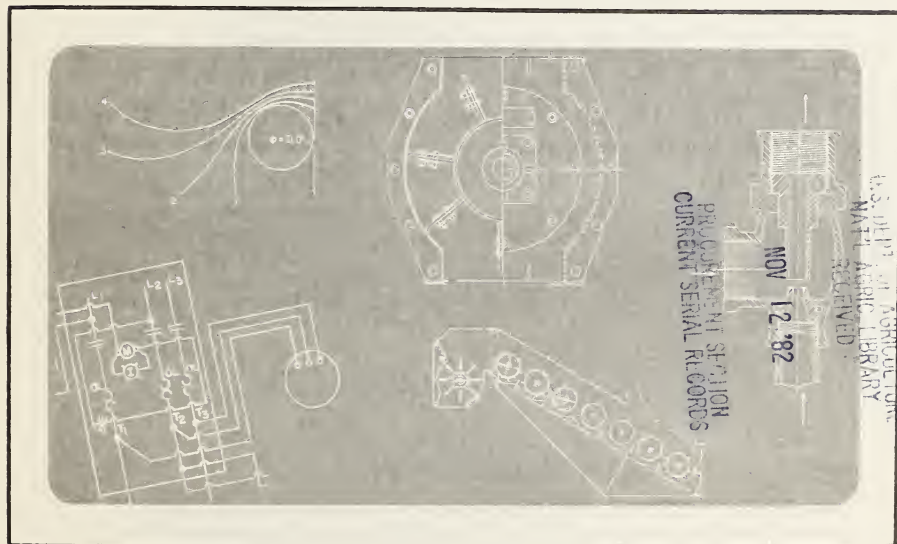
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Loading Live Poultry

A Time and Motion Study
of Loading Broiler Chickens by Hand,
Forklift Truck, and Squeeze-Lift Truck



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Loading Live Poultry

A Time and Motion Study of Loading Broiler Chickens by Hand, Forklift Truck, and Squeeze-Lift Truck

By A. D. Shackelford and V. Wilson Lee¹

ABSTRACT

Detailed time studies of methods and equipment for catching and loading broilers in poultry coops on farms in the Southeastern United States show the advantages and disadvantages of loading by hand, forklift truck, and squeeze-lift truck; how long each method takes; and how much labor is needed. Index terms: chickens, forklift trucks, mechanization, poultry, poultry industry, poultry loading, squeeze-lift trucks, time-motion studies.

INTRODUCTION

In 1979, about 3.8 billion broiler chickens were produced for marketing in the United States (U.S. Department of Agriculture 1979). Loading that many broilers to ship them to processing plants takes time. Finding the best way to catch and load the broilers for the least amount of time and money is a major problem facing the poultry industry today. In the integrated poultry industry, the problem is the processor's, who is responsible for removing the broilers from the production house and transporting them to the processing plant so it will have enough broilers to keep operating efficiently. The problem's cause is that catching crews use a tremendous amount of manual labor to catch and carry the broilers to the coops and the coops to the transport truck. The number of times coops and broilers are handled reflects the inefficiencies in catching and loading methods.

The industry is constantly searching for equip-

ment and methods for mechanizing the live-handling operations because of a shortage of workers willing to catch and load poultry. Poor working conditions and antiquated work methods depress labor availability. The working environment includes night-work, exposure to bad weather, and dust and odors that hamper the performance and reliability of the workers. But the operations are difficult to mechanize because broilers are reared in large flocks and open-floor houses.

During the last three decades, industry has made a major improvement by changing from batch weighing on the farm to bulk weighing on commercial truck scales. This change reduced the time and manpower requirements for loading broilers. It also spawned many different methods for catching and loading broilers by hand. Currently, there are almost as many variations in loading procedures as there are catching crews. Most loading procedures in use, with some minor modifications, were developed at the birth of the broiler industry.

Since 1967, the use of the powered-lift truck in live-handling operations has increased. The forklift truck and pallets are used to transport the coops from the transport trucks into the broiler house. Later, a hydraulically operated clamp was developed to replace the forks of the lift truck. The squeeze

¹Agricultural engineer, Richard B. Russell Agricultural Research Center, Science and Education Administration, U.S. Department of Agriculture, P.O. Box 5677, Athens, Ga. 30613, and economist, Auburn University Extension Service, Auburn, Ala. 36849.

clamp was designed to handle the coops onto and off the transport truck without a pallet.

The Poultrans system for transporting broilers from farm to processing plant was developed by Frank N. Reynolds and commercially tested in 1973 (Broiler Industry 1975). Broilers are transported in an enclosed trailer with a self-contained air-conditioning system for ventilation and belt conveyors to load and unload the birds. To load the birds at the house, the crew catch them and place them on a belt conveyor that carries them to the Poultrans truck. In 1969, the University of Georgia began developing an automated rearing facility for mechanically loading the birds onto a transport truck equipped with belt conveyors (Manbeck 1974). The broilers were mechanically herded onto a belt conveyor that was recessed in the concrete floor of the house. Reed (1972) reported one development of a herding device and on behavioral studies of broiler chickens on a belt conveyor.

Today, about 25% of the broilers are loaded by hand and the other 75% by powered-lift truck. This paper reports our study of the three commonest loading methods—hand, forklift, and squeeze-lift—and compares their crew and labor requirements. To do this study, we visited processing plants and live-haul contractors in the Southeastern United States and observed many variations in methods and equipment used for transporting live broilers from the broiler houses to the processing plants. We attributed the differences to company policy, processing production rates, receiving-dock facilities, and other related conditions.

EQUIPMENT AND FACILITIES

COOPS

Generally, coops used for handling broilers are about 2 feet wide, 3 feet long, and 10 to 12 inches high. The 10-inch-high coops are widely used in the Southeast. When large load capacities are not important (as on short hauls) and when daytime catching and hauling are done during hot weather, some firms use the 11- and 12-inch coops for more ventilation. For several decades, coops were wooden, but now several plastic models are available; these are more durable than wood and much lighter.

TRANSPORT-TRUCK TYPES

Today, many different truck types are used for transporting live broilers to the processing plant. State and Federal traffic regulations limit the gross weight and height of loaded trucks. The net payload on the trucks, therefore, is influenced by coop size and type, broiler density, and method of loading. Some firms and live-haul contractors have truck fleets with mixed transporting capacities; so, for example, to transport broilers from a house with a capacity of 10,000 broilers, one 6,000- and one 4,000-capacity truck would be dispatched rather than two 6,000-broiler-capacity trucks.

Generally, three types of trucks are used in the Southeastern States for transporting broilers. They are the single-axle, dual-axle, and tractor-trailer. All three transport trucks are loaded in rows 4 coops wide across the truck bed and 8 to 11 coops high. With 10- or 11-inch-high coops, the normal row is 9 or 10 coops high. So each row has 32 to 44 coops across the truck bed.

Single-axle truck

The single-axle truck has a short bed and a limited hauling capacity. Generally, it transports 7 rows of 40 coops—280 coops in all. When 12 broilers are placed in each coop, the truck has a load capacity of 3,360 broilers. During winter, each coop can hold 15 broilers; so truck capacity would be 4,200 broilers. The short, bobtailed trucks are normally used for short hauling distances and for transporting partial truck loads or small flocks.

Dual-axle truck

The dual-axle truck is about 6 feet longer than the single-axle truck and has space for 80 more coops when they are stacked 10 high—360 in all. If a platform is built over the cab, the truck can carry 60 more coops—420 in all. When 12 broilers are loaded per coop, the cab-over truck transports 5,040 broilers.

Truck and trailer

The trailer is about 42 feet long and generally transports 14 rows of 40 coops—560 coops in all. With 12 broilers per coop, the trailer can carry

6,720 broilers. These units are efficient for long hauls and where powered-lift trucks are used for field-handling operations.

POULTRY-HOUSE TYPES

This study is limited to one-story broiler houses because there are few two-story houses in the Southeastern United States. Broiler houses are long, rectangular structures usually with large doors at each end for equipment entry and small doors on the side for caretaker passage. Generally, broiler houses are 25 to 40 feet wide and 200 to 400 feet long. A typical broiler house (fig. 1) has a capacity of 15,000 broilers.

LOADING METHODS

After preliminary observations, we chose three types of catching and loading operations for detailed study and comparison. These systems were the commonest and are representative of all processors in the Southeastern United States. The systems selected were (1) broilers are caught, placed in coops, and loaded onto trucks by hand; (2) broilers are caught by hand and placed in coops that are handled into and out of the house on 6- by 8-foot pallets by a gasoline-powered forklift truck; and (3) broilers are caught by hand and placed in coops that are handled into and out of the house with a gasoline-powered lift truck equipped with a squeeze clamp.

EVALUATION OF SYSTEMS

EVALUATION METHODS

We did time studies of typical catching, cooping, and loading operations in the Southeastern United States. We tried to study the most commonly used methods and those that appeared to be most efficient. But it was not practical to observe and study all variations in methods used today. And, though all systems require preparing the house for catching and loading, we did not evaluate these operations because a different set of circumstances is encountered in each broiler house. For example, some houses have growing equipment (feeders, waterers, etc.) in many separate pieces; other houses have the equipment attached to cables so



FIGURE 1.—Typical broiler house.

that it can be winched off the floor and got quickly out of the way.

To measure the major work elements of the catching and loading operations, we used a decimal-minute stopwatch, an event recorder, and a motion-picture camera. During each time study, we estimated the effort level of each worker studied. Then we used the effort level, expressed as a percentage, to adjust the observed work pace to a normal work pace of 100%. We computed the normal time of each operation by multiplying the observed time value by the estimated effort level.

The time values we used are standard times—the normal work times plus allowances for personal needs and fatigue. The standard times that we developed provide a sound basis for comparison of crew sizes, methods, and equipment and can be used as a guide in establishing the minimum labor force needed for a given volume, method, and equipment. (See the appendix for tables detailing individual operations and their crew sizes and standard times.)

We computed production rates by determining the actual or base time required for an average worker or workers to perform an operation or series of operations, adjusting the figure to allow for fatigue and personal needs, then determined how many broilers the worker(s) can handle per hour. The production rates are based on the sustained productivity of an average worker. A better-than-average worker can increase productivity by as much as 25%.

CATCHING AND LOADING BY HAND

About 25% of the broilers raised in this country are caught and loaded by hand. After a truckload of

Herdin broilers is done mainly in hand-loading operations. Workers drive 1,000 to 3,000 broilers to an area next to the door where the truck is parked. The broiler density in the load-out area is increased two or three times, making catching easier and shortening the distance the broilers must be carried to the truck. Generally, the driving operation is done by three to six members of the catching crew. They walk through the flock toward the center of the house, cut off part of the flock, and drive the broilers to the catching pen by frightening them—shouting, whistling, waving objects, and beating on posts or equipment.

The driving operation can bruise the birds, especially if posts or equipment are in their way. Flock panic also causes the broilers to pile up. If they are not immediately scattered, those on the bottom will suffocate. Naturally, broilers being driven in daylight will be much more excited than those driven at night under artificial lighting. Also, at night the broiler-house lights can be turned off and colored lights switched on when the drive is over, and the birds will settle down in the semi-darkness. The crew will be working by the light of an extension lamp illuminating the truck or by the colored lights inside the house. Broilers will need little herding if they can be loaded out through the side doors and both ends of the broiler house. This is possible if access roads are built all around it, as is generally done in areas where the terrain is level.

Catching and loading broilers

Once the transport truck has been positioned and set up for loading and the broilers have been driven to the load-out door and penned off, the catching and loading operation begins. The most common crew arrangement has two catchers, three or four bird carriers, and two coopers working on the truck. The catchers start at the door entrance and work back through the flock. The two catchers kneel or squat and proceed side by side through the broilers without rising as the catching operation progresses. Holding the birds by their feet, the carriers take one handful (one-half coopful of broilers) from each catcher; so, on each trip, a carrier generally transports one coopful of broilers. One carrier's load varies from 10 to 16 broilers, depending on the time of year and broiler weight. The



FIGURE 2.—Typical truck setup before loading. Note coops arranged as steps.

empty coops has been positioned near the entrance to the broiler house, certain crewmembers remove some of the empty coops and prepare the truck for loading; other crewmembers enter the broiler house and prepare to catch and load the broilers. Once all preparations are made, the crew separates into catchers, carriers, and coopers. Handling crews vary in how they operate; each crew has its own ideas about the best way to catch and load broilers. But certain general procedures are common to all the crews studied.

Truck setup

The truck should be as close to the house as possible; so it is usually parked perpendicular to the large doors at the end of the house. The most common method of loading is to hand-carry the broilers to the truck and place them in coops. Setting up the truck required releasing and removing coop tiedown chains, removing two or three rows of empty coops from the truck and stacking them on the ground, and arranging the coops as steps so the crew can walk up onto the truck with the broilers (fig. 2). The steps should be about 9 feet wide so that workers can pass each other going up to and down from the truck. About 80 empty coops are set off the truck to provide room for loading and stacking full coops. These coops are filled last and are used for finishing or tailing out the load.

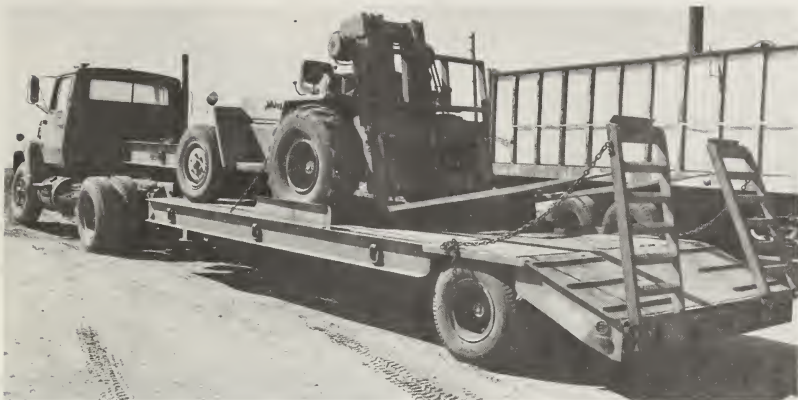


FIGURE 3.—Lift transporter.

carriers transport the broilers about 40 feet to the truck, climb the steps made from empty coops, and place the broilers in a coop. The coopers, working on the truck, position empty coops for filling and open and close the coop doors. When the stacks get above five coops high on the truck, one of the coopers will stand on top of the stacks and coop the broilers.

Another version of the hand-loading system requires each worker to catch and carry broilers to the truck. Although this version eliminates the transfer of broilers from catcher to carrier, catching and holding a coopful of broilers is difficult. Often, a worker will catch and transfer only half a coopful of broilers at a time.

Production rates and labor requirements

Combining catching and carrying reduces the elapsed time required to load 12,000 broilers by 0.3037 hour and reduces the labor required by 2.4296 man-hours (table 1). So, eliminating the transfer of broilers from catcher to carrier does save time. The total labor required to set up trucks, drive broilers, and catch and hand-load broilers is 28.89 man-hours for the catcher, carrier, cooper method and 26.46 man-hours for the catcher-carrier and cooper method (table 2). The unproductive time of the crews cannot be used because the truck

setup has to be completed before the broilers can be driven. The drive times are the same for both methods. The unproductive time during the drives is caused by the length of the drive and the unpredictability of the broilers.

LOADING BY FORKLIFT TRUCK

Loading by forklift truck requires the forklift truck with operator, a lift transporter, transport trucks, pallets, and a catching crew. A lift transporter (e.g. fig. 3) is needed because of the distances between producers and the processing plant. With the introduction of the lift truck, house preparation was shifted from the catching crews to the producer. In all our studies of lift-truck operations, the broiler houses were set up by the producer before the arrival of the crew; so the crews can begin catching and loading operations almost immediately.

Transport trucks

The types of trucks used in transporting palletized loads are flat-beds and trailers. The flat-bed truck (fig. 4) can hold 8 to 10 full-size (6 by 8 feet) pallets. These trucks are used where conditions around the house limit the truck size or where the flock is small. The tractor-trailer works well where

Table 1.—Production rates for 8 workers to hand-load 12,000 broilers by 2 methods—coops used as steps

Method	Elapsed time per 12,000 birds (hours)	Average production per hour	
		Birds	Coops (12 birds each)
Catchers, carriers, coopers	3.6115	3,322.72	276.89
Catcher-carriers and coopers	3.3078	3,627.79	302.32

Table 2.—Labor requirements for hand-loading 12,000 broilers—coops used as steps

Operation	Workers required	Labor required (man-hours)		
		Productive	Unproductive	Total
Truck setup:				
Cab-over	3	0.6856	1.1426	1.8282
Short-bed	3	.4652	.7753	1.2405
Cab-over	3	.6856	1.1426	1.8282
Drive chickens:				
1st drive	5	.4365	.2619	.6984
2d drive	5	.7737	.4642	1.2379
3d drive	5	1.0833	.6500	1.7333
4th drive	5	1.1782	.7069	1.8851
Catch and coop:				
Catchers, carriers, coopers:				
Catch	2	4.6100		4.6100
Carry	4	8.7800	.4400	9.2200
Coop	2	4.3900	.2200	4.6100
Total	8	17.7800	.6600	18.4400
Catcher-carriers and coopers:				
Catch and carry	6	12.0083		12.0083
Coop	2	4.0028		4.0028
Total	8	16.0111		16.0111
Setup, drive, catch, and coop:				
Catchers, carriers, coopers ¹	8	23.0881	5.8035	28.8916
Catcher-carriers and coopers ²	8	21.3192	5.1435	26.4627

¹Elapsed hours—3.6115.

²Elapsed hours—3.3078.

adequate roads and maneuvering space are provided around the broiler house. The trailers normally transport 12 to 14 of the full-size pallets. The truck-driver prepares the transport truck. Because the driver is not part of the live-handling crew, we omitted truck preparation from our time studies.

Lift-truck operations

The lift operator alines the tines of the lift truck with the pallets as the machine approaches the

transport truck. The lift removes the pallet of empty coops from the transport truck. The loaded lift is backed away, stopped, and driven forward into the house. The pallet is set down inside the house. The lift backs out of the house, turns, stops, and drives toward the live-haul truck. Another load of coops is taken into the house and placed beside the first pallet (fig. 5). The lift backs up, stops, and drives forward to engage the full pallet. The full pallet is picked up and moved out of the house and placed on the transport truck. The loading routine continues.



FIGURE 4.—Flat-bed truck with pallets.



FIGURE 6.—Crew catching and loading broilers.



FIGURE 5.—Lift truck placing a pallet inside the house.

Catching crew

A catching crew usually has five workers. The catching job begins when the first pallet load of empty coops is placed in the house. The crew begins removing 24 to 32 coops from the pallet. The bottom coops are left to be filled on the pallet. Each worker begins catching, carrying, and cooping broilers (fig. 6). In some organizations, each crewmember will catch one-half coopful per trip; in others they will catch one coopful per trip. As each coop is filled, the door is closed and another empty coop is positioned on the stack for loading. The loaded pallet is removed from the house and loaded on the transport truck (fig. 7). As one pallet is completed, another is in position to be loaded.



FIGURE 7.—Lift truck loading a pallet on the transport truck.

Table 3.—Labor required to load 12,000 broilers with a forklift truck and pallets

Operation	Workers required	Labor required (man-hours)		
		Productive	Unproductive	Total
Forklift preparation	1	0.2844	1.4219	1.7063
Forklift handling pallets . . . }		1.0927	.4161	1.5088
Catching and loading	5	7.5440	.....	7.5440
Total ¹	6	8.9211	1.8380	10.7591

¹Elapsed hours—1.7932.

Production rates and labor requirements

Six people and a forklift truck with full-size pallets can load 6,692 birds into 558 coops per hour. The elapsed time to catch and load 12,000 broilers is 1.79 hours. The total labor required to catch and load 12,000 broilers with this system is 10.76 man-hours (table 3). Forklift preparation causes some unavoidable unproductive time because the catching crew cannot begin until the coops are placed inside the house. The unproductive time of the forklift operator decreases during wet weather and as travel distances outside the broiler house increase. The catching and loading crew have no unproductive time because the lift operator supplies coops faster than the crew can catch and load the broilers.

LOADING WITH A SQUEEZE-LIFT

The squeeze-lift

Once the powered-lift trucks were being used for on-farm handling of broilers, a squeeze clamp was developed for handling chicken coops. The clamp, mounted on the lift mast, replaced the lifting tines of the forklift. The arms straddle a single row of coops and extend across the width of the truck bed. The normal load of the squeeze-lift truck is 20 to 24 coops. This loading method uses the squeeze-lift, an operator, transport trucks, and a catching crew. The transport truck is parked near the house, and the driver sets it up for loading. The clamp arms need about 8 inches between rows of coops, so the truckdriver slides each row into position on the truck bed (fig. 8).

The transporter for the squeeze-lift truck is like the transporter for the forklift truck. When the

carrier arrives at the broiler house, the ramps are lowered to the ground and the lift truck is driven to the live-haul truck. The transport trucks used with the squeeze-lift system are also like those used in other systems. In most squeeze-lift systems, the transport truckdriver is responsible for the truck setup. As in the forklift system, we omitted detailed time studies of the truck setup because we did not consider truckdrivers part of the live-handling crews.

Squeeze-lift operation

The lift operator alines the clamp arms on the row of coops as the lift approaches the transport truck. When the lift stops, the operator closes the clamp arms and picks up 20 to 24 empty coops. The lift backs away from the truck and drives into the house. Inside the house, the operator stops the lift, lowers the coops to the floor, and releases the load. The lift returns to the transport truck to get another load of coops, takes them to the house, and sets the empty coops beside the first load. The lift backs away, stops, and drives forward to pick up the row of full coops. The full coops are taken out of the house and placed on the transport truck.

Catching crew

Normally, catching crews for squeeze-lift operations have six workers. Each crewmember performs the same tasks. They catch, carry, and coop birds and handle the empty coops. The loading operation begins when the lift sets the empty coops down inside the house. The crew places coops in a row on the floor and opens the doors. When the worker fills a coop, he closes the door and places an empty coop with the door open on top of the full coop. Then he returns to catch another load of broilers.

Table 4.—Labor required to load 12,000 broilers with a squeeze-lift truck

Operation	Workers required	Labor required (man-hours)		
		Productive	Unproductive	Total
Squeeze-lift preparation	1	0.2844	1.9908	2.2752
Squeeze-lift handling coops		1.8233	.....	1.8233
Catching and loading	7	11.9774	.7854	12.7628
Total ¹	8	14.0851	2.7762	16.8613

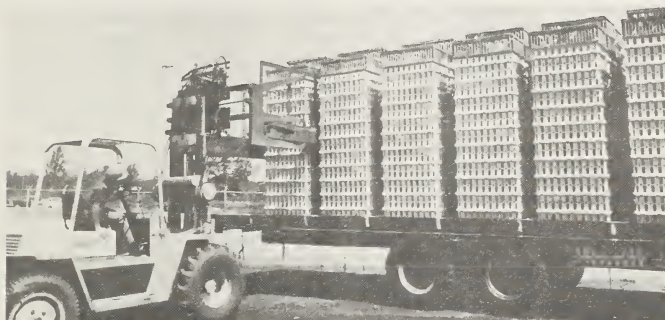
¹Elapsed hours—2.1077.

FIGURE 8.—Transport truck set up for squeeze-lift loading.

The routine of catching and cooping progresses through the house until all the broilers are loaded.

Production rates and labor requirements

The average output of a crew of seven and a powered-lift truck equipped with a squeeze clamp is 5,690 broilers in 406 coops per hour. The elapsed time to catch and load 12,000 broilers is 2.10 hours. The total labor required to catch and load 12,000 broilers with this system is 16.86 man-hours (table 4). Like forklift preparation, squeeze-lift preparation causes some unavoidable unproductive time because the catching crew cannot begin until empty coops are placed inside the house.

COMPARISON OF SYSTEMS

The labor requirements for each system are a basis for comparing the different live-handling

Table 5.—Comparison of three methods for loading 12,000 broilers

Method	Crew size	Elapsed time (hours)	Labor (man-hours)
Hand-loading:			
Catchers, carriers, coops	8	3.6115	28.8916
Catcher-carriers and coops	8	3.3078	26.4627
Forklift with full-size pallets	6	1.7932	10.7591
Squeeze-lift	8	2.1089	16.8712

operations (table 5). We used figures for the crew arrangements that resulted in the lowest labor requirements for each method. The forklift method needed the least time for loading 12,000 broilers. But the forklift method requires that the receiving dock at the processing plant have a layout designed to handle pallets. The other methods do not necessarily affect receiving operations.

Hand-loading requires 1.52 man-minutes to catch, carry, and coop one coopful of broilers. Forklift loading needs only 0.452 man-minutes for one coopful. The catching time is the same for both methods. The differences occur in cooping and walking times, especially the walking times because of distances involved. In the squeeze-lift and forklift systems, the lift trucks set the pace of the catching crews. The times required by the lift trucks for transporting coops into and out of the house were equal. With a payload of 20 coops for the squeeze-lift and 40 coops for the forklift, the squeeze-lift makes two trips for each trip of the forklift. For the squeeze-lift operator, the productive labor for loading 12,000 broilers was 2.1089 man-hours; for the forklift operator, it was 1.3771 (tables 3, 4).

OTHER FACTORS AFFECTING LABOR REQUIREMENTS

Several factors can increase the labor requirements for live handling of broilers in the field. One of these is crew personnel. Others are related to broiler behavior, broiler-house conditions, and weather. Maintaining a balanced crew is essential in each system for efficient operations. A short crew decreases productivity more in the hand-loading system than in the lift-truck systems.

The overall crew performance of each method is influenced by conditions in and around the broiler house. Obstacles on the floor of the house such as feedbins, feeders, and waterers can reduce the handling crew's performance. Broiler houses with low ceilings and center aisles less than 14 feet wide reduce the efficiency of lift-truck operations. Poor roads, and lack of adequate truck-maneuvering area and access to a load-out door affect crew productivity by limiting equipment size and by dictating the transport-truck loading position. In hand-loading operations, the transport truck must be parked as near the house as possible to minimize the walking distances of the catching crew. The powered-lift trucks must have an unobstructed drive area. Operations with powered-lift trucks become less efficient as travel distances outside the house increase beyond 100 feet.

SUGGESTIONS

To maximize lift-truck efficiency for live-broiler handling and for more efficient hand-loading operations: (1) access roads to and around the broiler house should be all-weather roads with moderate grades and curves capable of handling tractor-trailer trucks; (2) the space near the house entrance should have a fairly level, well-drained gravel or hard-surface loading area big enough for lift-truck maneuvering during unloading and loading; (3) house interiors and load-out doorways should have at least an 8-foot head clearance; (4) the center aisle of the house should be at least 14 feet wide; (5) feeders, waterers, and heating equipment should be in parallel lines on either side of the house and located between the wall and any aisle posts, and designed to be raised to the ceiling during catching operations; (6) the producer should prepare the house—removing or raising equipment before live-handling operations—so that damage to growing equipment is minimized and bird-handling operations improved; also, the caretaker can move through the flock without exciting the broilers because they are accustomed to his presence; and (7) the house should have two independently operated lighting systems, one with white lights and the other with blue or red lights so that colored lights can be used during catching and loading operations; instead of a separate system with colored lights, dimmer switches could be installed on the white lights; either method is more efficient in night operations than simply turning off the house lights and working by flashlight.

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APPENDIX.—LABOR REQUIREMENTS FOR SEGMENTS OF LOADING OPERATIONS

Table A-1.—Labor required for preparation of transport truck and broiler house

Operation	Crew size	Normal time (man-minutes)	Standard time ¹ (man-minutes)
<i>Prepare cab-over truck with 420 wooden coops—arrange coops as steps.</i> Starts when live-haul truck is positioned at load-out door of house. Includes unbuckling tiedown chains, pulling chains off coops, folding chains on side rails, unloading 24 coops off cab-over, unloading 40 coops off main truck bed, stacking 30 coops in stairsteps at side of truck, stacking remaining 34 coops on ground next to house (sometimes 10-15 of these are carried inside house to be used for penning off), opening 8 coop doors. Ends when last coop door is opened.	3	11.9223	13.1707
<i>Prepare short-bed truck with 252 wooden coops—arrange coops as steps.</i> Starts when live-haul truck is positioned at load-out door of house. Includes unbuckling tiedown chains, pulling chains off coops, folding chains on side rails, unloading and stacking 30 coops in stairsteps at side of truck, unloading and stacking 38 coops on ground, opening 4 coop doors on bottom layer of 1st row to receive broilers. Ends when last coop is opened.	3	8.0900	9.3035
<i>Prepare broiler house.</i> Starts when 1st crewmember enters house. Includes turning off lights, stacking manual feeders, raising or lowering automatic feeders, raising or removing waterers, opening main load-out doors, covering wet spots in litter with dry litter, securing catching-pen barrier. Ends when lights are turned on for driving.	5	27.5042	8.6298

¹Normal time plus 15% allowance.

²Average for various combinations of equipment and routines found in the study.

Table A-2.—Labor required for 5 workers to herd 12,000 broilers in 4 drives

Operation	Normal time (man-minutes)	Standard time ¹ (man-minutes)
<i>1st broiler drive.</i> Starts when crewmembers are abreast of each other about 1/3 of house length from the catching area. Includes walking, waving arms, clapping hands, making loud noises, turning off lights, penning off birds. Ends when crew completes installation of temporary barrier across house.	4.5548	5.2380
<i>2d broiler drive.</i> Starts when 1st crewmember begins to dismantle catching-pen barrier. Includes dismantling barrier, turning on lights, walking about 1/2 of house length, driving chickens, turning off lights as drive progresses down the house, setting up catching-pen barrier. Ends when crew completes barrier.	8.0730	9.2840
<i>3d broiler drive.</i> Starts when 1st crewmember begins to dismantle barrier. Includes turning on lights, walking about 3/4 of house length, driving chickens, turning off lights as drive progresses down the house, setting up catching-pen barrier. Ends when crew completes barrier.	11.3044	13.0000
<i>4th broiler drive.</i> Starts when 1st crewmember begins to dismantle catching-pen barrier. Includes dismantling barrier, turning on lights, walking full length of house, driving chickens, turning off lights as drive progresses down the house, setting up catching-pen barrier. Ends when crew completes barrier.	12.2939	14.1380

¹Normal time plus 15% allowance.

Table A-3.—Labor required for one worker to catch and transfer one-half coopful of broilers

Operation	Normal time (man-minutes)	Standard time ¹ (man-minutes)
<i>Catch.</i> Worker is kneeling. Starts when worker reaches for 1st broiler. Includes searching, reaching for birds, grasping, holding, accumulating broilers in 1 hand. Ends when desired number of broilers is accumulated in 1 hand:		
6 broilers.....	0.0705	0.0811
7 broilers.....	.0854	.0982
<i>Transfer.</i> Starts when worker reaches for broiler. Includes reaching, grasping, taking broilers from catcher. Ends when catcher releases broilers.....	.0498	.0572

¹Normal time plus 15% allowance.

Table A-4.—Labor required for one worker to carry one coopful of broilers to transport truck and return

Operation	Distance (feet)	Normal time (man-minutes)	Standard time ¹ (man-minutes)
<i>Walk loaded to truck bed.</i> Starts when worker receives broilers from catcher.	20	0.1343	0.1545
Includes straightening body, turning, walking with broilers (about 50 lb)	30	.1487	.1710
out of house, climbing 4 steps to truck bed. Ends when worker's foot	40	.1722	.1980
touches truck.....	50	.2034	.2339
<i>On truck.</i> Starts when worker's foot touches truck bed. Includes walking on truck bed, climbing coops, putting broilers into coop or transferring to cooper, walking down coops and back to edge of truck bed. Ends when worker steps from truck.....		.1090	.1253
<i>Walk empty.</i> Starts when workers foot leaves truck bed. Includes walking down	20	.0636	.0731
steps and into house. Ends when worker bends over to receive broilers.	30	.0867	.0998
	40	.1272	.1463
	50	.1590	.1829

¹Normal time plus 15% allowance.

Table A-5.—Labor required for one worker to prepare forklift or squeeze-lift truck at loading site

Operation	Normal time (man-minutes)	Standard time ¹ (man-minutes)
<i>Unload lift truck.</i> Starts when worker stops lift transporter. Includes blocking transporter wheels, placing ramps, cranking lift motor, backing lift off transporter, driving to live-haul truck. Ends when leading edge of lift mechanism reaches edge of truck bed. . . .	16.2500	17.0625

¹Normal time plus 5% allowance.

Table A-6.—Labor required for one worker to catch, carry, and coop broilers for loading with forklift or squeeze-lift truck

Operation	Normal time (man-minutes)	Standard time ¹ (man-minutes)
<i>Catch.</i> Worker is kneeling. Starts when worker reaches for 1st bird. Includes searching, reaching for birds, grasping, holding, accumulating birds in each hand. Ends when desired number of birds is accumulated:		
12 birds	0.2182	0.2509
<i>Carry.</i> Starts when worker begins to straighten from catching position. Includes straightening, turning, walking loaded to coops (about 10'). Ends when worker begins lifting birds toward coop .....	.0734	.0844
<i>Coop birds and stack empty coop.</i> Starts when worker begins lifting birds toward coop. Includes lifting birds, placing 1 handful at a time in coop, spreading birds in coop, closing coop door, placing empty coop on top of full coop, opening coop door. Ends when door is open and worker's hand leaves coop .....	.1738	.1999
<i>Return to catch.</i> Starts when worker's hand leaves coop. Includes walking (about 10'), stopping, bending over, kneeling. Ends when worker reaches for 1st bird .....	.0554	.0637

¹Normal time plus 15% allowance.

Table A-7.—Labor required to load broilers into coops on forklift pallet

Operation	Crew size	Normal time (man-minutes)	Standard time ¹ (man-minutes)
<i>Pallet 6' by 8', contains 32 coops. Load pallet.</i> Starts when lift operator sets pallet down in house. Includes removing 12 coops from each end of pallet, stacking coops on house floor, opening 8 coop doors on remaining bottom layer of coops, catching birds, carrying, cooping, closing coop doors, stacking empty coop on top of full coop, opening door of empty coop. Ends when last coop is filled and coop door is closed:			
Wooden coops, 12 birds per coop	5	3.1488	3.6211
<i>Pallet 6' by 8', contains 40 coops. Load pallet.</i> Starts when lift operator sets pallet down in house. Includes removing 16 coops from each end of pallet, stacking coops on house floor, opening 8 coop doors on remaining bottom layer of coops, catching birds, carrying, cooping, closing coop doors, stacking empty coop on top of full coop, opening door of empty coop. Ends when last coop is filled and coop door is closed:			
Wooden coops, 12 birds per coop	5	3.9360	4.5264
Wooden coops, 14 birds per coop	6	5.0025	5.7529
Plastic coops, 14 birds per coop	6	4.6455	5.3423

¹Normal time plus 15% allowance.

Table A-8.—Labor required for one worker to load broilers with forklift

Operation	Normal time (man-minutes)	Standard time ¹ (man-minutes)
<i>Set down full pallet on truck and pick up empty pallet from truck.</i> Starts when leading edge of pallet reaches edge of truck bed. Includes positioning pallet, shifting sideways, lowering lift tines, releasing pallet, backing lift away from truck, stopping, driving lift forward, engaging tines in empty pallet, stopping lift truck, raising lift tines, reversing lift. Ends when trailing end of pallet clears edge of truck bed	0.7541	0.7918
<i>Transporting empty coops from truck into house.</i> Starts when trailing end of pallet clears edge of truck bed. Includes backing up, stopping, turning, driving forward (average 150') into house. Ends when forward motion stops . . . . .	.5865	.6158
<i>Set down pallet load of empty coops and pick up pallet load of full coops.</i> Starts when forward motion of truck stops. Includes lowering pallet to floor, backing away (about 30') driving forward, engaging tines in full pallet, stopping, raising pallet from floor. Ends when backward motion of truck begins . . . . .	.5057	.5310
<i>Transporting pallets of loaded coops from house to truck.</i> Starts when backward motion begins. Includes backing out of house (average 150'), turning, alining, raising pallet, driving toward truck. Ends when forward edge of pallet reaches edge of truck bed . . . . .	.6513	.6839

¹Normal time plus 5% allowance.

Table A-9.—Labor required to load broilers in one squeeze-lift load of coops

Operation	Crew size	Normal time (man-minutes)	Standard time ¹ (man-minutes)
<i>Load coops.</i> Starts when lift truck has backed up and squeeze arms have cleared coops. Includes restacking empty coops in line on floor, opening 4 coop doors on bottom layer of coops, closing coop doors, stacking empty coops on top of full coops, opening doors of empty coops. Ends when last coop is filled and coop door is closed:			
20-coop load:			
12 birds per coop	25	2.5015	2.8767
14 birds per coop	37	2.1149	2.4321
15 birds per coop	24	4.5129	5.1898
15 birds per coop	25	3.4144	3.9266
24-coop load:			
14 birds per coop	37	2.3488	2.7011

¹Normal time plus 15% allowance.²Includes one coop stacker.³Includes two coop stackers.

Table A-10. — Labor required for one worker to load broilers with squeeze-lift

Operation	Normal time (man-minutes)	Standard time ¹ (man-minutes)
<i>Set down loaded coops on truck bed and pick up empty coops.</i> Starts when forward tips of squeeze arms reach edge of truck bed. Includes positioning coops, shifting sideways, lowering clamp, releasing coops, backing up (about 30'), stopping, realining truck, driving lift forward, positioning clamp arms around empty coops, closing clamp, lifting coops, backing up. Ends when trailing end of clamp clears edge of truck bed	0.5308	0.5573
<i>Transporting empty coops into house.</i> Starts when trailing end of clamp clears edge of truck bed. Includes backing up, stopping, turning, driving forward (average 150') into house. Ends when forward motion stops . . . . .	.5865	.6158
<i>Set down empty coops and pick up full coops.</i> Starts when forward motion of truck stops. Includes lowering coops to floor, opening clamp arms, backing up (about 30'), stopping, alining truck with full coops, driving forward, straddling coops with clamp, stopping, closing clamp, raising coops. Ends when reverse motion of truck begins . . . . .	.3152	.3310
<i>Transporting full coops from inside house to truck.</i> Starts when reverse motion of truck begins. Includes backing out of house, (average 150') turning, stopping, alining lift truck, raising coops, driving toward truck. Ends when forward tip of clamp arms reaches edge of truck bed6513	.6839

¹Normal time plus 5% allowance.

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